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1/18

Serial Number: 08/813,247
Appn. Filed : 03/07/97
Applicant   : Mitsuhiro Aida
Appn. Title : Handwriting Text Input System
Examiner/GAU : Stephen S. Hong / 2176

Mailed on : June 12, 2001
At   : Nara City, Japan

Commissioner of Patents and Trademarks
Washington, DC 20231

Sir:

    In response to the Office communication mailed on 04/23/01, revised specification and claims with a view to overcoming the Examiner's objections are attached.

    Applicant makes following comments.

    The U.S. Patent No. 5109352 (O'Dell) has features to input a stroke code from a keyboard, and has a common way to accept a leading part of stroke codes from the keyboard, compare the entered stroke codes with the contents in a table or in a dictionary, display matched characters on the display, and an operator gets it.

    It is stated in the specification that the appratus comprises controller means for comparing the code numbers entered by the operator as they are entered to the strings in the first storing means and for causing the display means to display the shape of a character from the second storing means when the code numbers entered by the entering means uniquely identify said character, so that some characters are uniquely identifiable before entry of all the strokes of such characters, as shown in Figure 5. The inventor of U.S. Patent# 5109352 discovered that some characters are uniquely identifiable in the example shown in the patent documents. However, it has incompleteness, e.g. some

Japanese kanji characters do not have a chance to appear on the display according to the method in the patent 5109352, unless the operator forces to continue to input after having some characters on the display, as mentioned below. It is one of the reasons why a traditional way of Japanese kanji character input method in the Appendix I, page 5/18 (which was attached to applicant response of January 25, 2001) is used, and why the way claimed in this applicant's patent application, should be in use.

U.S. Patent # 5109352, Figure 5:
CHARACTERS AND THEIR DATA STRINGS
距   12313131.3233
踊   12313132.412331
踐   12313133.33444
路   123131342.4123
跡   123131343.4744
跳   123131344.4844 (OR 123131348. 44-ALTERNATE DATA
踏   12313137.2441233   STRING
国   12313334.3
虫   1231340.(0=END OF CHARACTER KEY) THE ZERO
                         IS A KEYSTROKE, BUT IS NOT ACTUALLY
                         STORED.

According to the method (5109352), as an example, the followings inevitably take place, prior to reaching and getting one of such characters as 距、踊、踐、路、跡、etc in Figure 5.

(Examples)
After typing codes upto ｜ ７ ￣   , 口 appears on the display,
〈 At this point, operator's action is necessary to continue the input process, prior to reaching characters below 〉
and, after typing codes upto ｜ ７ － ￣   , 中 appears on the display,
〈 At this point, operator's action is necessary to continue the input process, prior to reaching characters below 〉

and, after typing codes upto ｜ㄱ－｜－｜ , 叫 appears on the display,

< At this point, operator's action is necessary to continue the input process, prior to reaching characters below,

CHARACTERS AND THEIR DATA STRINGS

距   12313131.3233
踊   12313132.412331
践   12313133.33444
路   123131342.4123
跡   123131343.4744
跳   123131344.4844 (OR 123131348.44-ALTERNATE DATA STRING)
踏   12313137.2441233

The above steps take place, even if it was different from what was anticipated by the operator.

* For example, 口、中、叫 are frequently used Japanese characters.

In this case, ｜ㄱ‐ of 足 equals to 口

    ｜ㄱ‐‐of 足 euqals to 中

   ｜ㄱ－｜‐｜of 足 equals to 叫

The Examiner also stated in paragraph 9 of the Office communication that "Figure 5 (USP#5109352) shows the plurality of lines of words with the same initial stems."

However, 足 in Figure 5 is not a stem. It is one of radicals for Japanese kanji characters, and those radicals do not necessarily form a leading part of the Japanese kanji character, as shown in the Appendex II, pages A-1/3, 2/3, 3/3, and Figure 5 of the patent (5109352) does not show the stem, as you can see, eg. 茄 for 刀(Radical), 妾 for 女(Radical), 惣 for 心 (Radical), 拠 for ㄣ (Radical) and so on.

The Examiner also stated in paragraph 9 of the Office communication that "O'Dell discloses ,,, ; random access storing the plural lines of text and the unique line of text," and "Note

that all data are stored in a random access fashion, since RAM is part of the storage in FIG. 4."

However, it does not mean "Storing and retrieving in a random access manner." Usually, data are stored in a table or a dictionary sequentially, and accessible one by one, from the beginning of the data area. This is called Sequential access." There is another one which is called "Random access or Direct access. In latter cases, data are not sequentially stored. Instead, data are stored in a specific location of data area which is determined to be there, by converting part of data into some specific position information in the area to store data. A problem may occur by converting and assigning same location to the plenty of data to store and retrieve during the above conversion, but those can be managed to reallocate and make an additional links for them, to later access properly.

In the present invention, data are mainly organized in the sequential manner and accessed by "binary search" method to retrieve data record directly, collating the entered data with those in the middle of data area in the dictionary, dividing data area into 2 and utilizing a first part or a latter part, depending on the result of collation made previously to compare the input data with those in the dictionary.

The conventional method has features to input a character from a keyboard, and has a common way to accept a leading part of word from the keyboard, compare the entered characters with the contents in a table or in a dictionary, display matched words on the display, and an operator is able to select a desired word among them on the display.

However, it is not possible for the operator to type characters in a blind touch (eyes-free) manner due to the way to select one of them on the display. It is also unlikely that the operator reiterates the steps to enter and select the desired one among words shown on the display, character by character. For example, assuming that the operator is going to input "tremendous", he enters "t" and takes a look at the display if there is the word which may lead to "tremendous", and goes back to the next

character input, after recognizing so many words on the display with a leading character of "t." The operator continues to enter next "r" which builds a string of characters ~ and the method searches in the dictionary to get the words having leading ~ and many words again appear on the display for the selection, as well. Those steps continue until one of them is selected by the operator, and it is impracticable, except some particular case which may disregard efforts of those repetitive steps.

The method of present invention is to achieve a target to eliminate such deficiency of the conventional input method, for both of the character and stroke data input.

Applicant's method requires no special-purpose dictionary, but utilizes a standard dictionary, or an abbreviation dictionary if it is useful, though the abbreviation dictionary is not imperative in the present invention. Where there is the abbreviation dictionary, applicant' s method does still not require to input all of the characters of abbreviation, because of the applicant's method to find the unique one which include the entered line of text in a variety of data input form, in the dictionary, without depression of any special function key to collate, determine and replace the data input with the unique data from the dictionary, and requires no more input. Then, the operator does not have to remember the abbreviation and also may input part of the abbreviation consisting of the first character followed by some other variable characters of the abbreviation to have it unique in the dictionary.

A text input system of the present invention according to the claim 63 has a feature to enter a line of text, character by character, collate the entered line of text with a dictionary storing a plurality of lines of text and relevant words, determine a unique line of text in the dictionary which includes the entered line of text, and select a unique word among relevant words at the time of character input, without being actuated by the depression of a special function key, and replace the entered line of text with the unique line of text or the unique word in the dictionary. None of the cited references discloses or suggests any means of

determining, selecting, and replacing the entered line of text with the unique line of text or the unique word determined by means for determining and selecting, by way of entering the line of text, character by character, without the necessity to depress a special function key to collate, determine, select, and replace.

A text input system of the present invention according to the claim 64 has a feature to enter a line of text, character by character, collate the entered line of text with a dictionary, identify plural lines of text with the same stem of word which includes said entered line of text, and determine a unique line of text which has the same last character as the last entered character, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input, and also identify plural lines of text with the same stem of word which includes entered line of text, and determine the unique line of text which includes the same one as the last entered character in the remaining part of line of text in the dictionary other than that was successfully collated with the entered line of text, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input. None of the cited references discloses or suggests any means of identifying plural lines of text with the same stem of word and determining the unique one which has the same last character as the last entered character, or which includes the same one as the last entered character in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text.

A text input system of the present invention according to the claim 65 has a feature to enter a line of text, character by character, collate the entered line of text with a dictionary, identify plural lines of text with the same first part as entered line of text, and determine a unique line of text which has the same last character as the last entered character, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input, and also identify plural lines of text with the same first

part which includes entered line of text, and determine the unique line of text which includes the same one as the last entered characters in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input. None of the cited references discloses or suggests any means of identifying plural lines of text with the same first part as said entered line of text, and determine the unique line of text which has the same last character as the last entered character, or which includes the same one as the last entered character in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text.

A text input method of the present invention according to the claim 66 has a feature to enter a first character followed by some other following characters of a line of text, character by character, and collate entered line of text with a dictionary, determine a unique line of text in the dictionary which includes the first character and some other following characters of line of text, at the time of character input, without being actuated by the depression of a special function key. None of the cited references discloses or suggests any step of determining the unique one in the dictionary by way of entering the first character and some other following characters, without necessity to depress the special function key to collate, determine, and replace.

A text input system of the present invention according to the claim 67 has a feature to enter a line of text, character by character, collate entered line of text with a dictionary storing a plurality of lines of text, original words, and a unique position count, and determine a unique line of text which has the same unique position count as the number of last collated character position of line of text in the dictionary, without being actuated by the depression of a special function key, at the time of character input. None of the cited references discloses or

suggests any means of determining the unique line of text which has the same unique position count as the number of last collated character position of line of text in the dictionary collated with entered line of text.

A text input system of the present invention according to the claim 68 has a feature to store a plurality of lines of text, in a dictionary.

A text input system of the present invention according to the claim 69 has a feature to enter a line of text of handwriting strokes, stroke by stroke, collate entered line of text with a dictionary storing a plurality of lines of text of handwriting strokes, original words for said line of text of handwriting strokes and a unique position count in a dictionary, determine a unique line of text of handwriting strokes in said dictionary which includes said entered line of text of handwriting strokes and which has said unique position count same as the number of last collated stroke position of said line of text of handwriting strokes in said dictionary collated with said entered line of text of handwriting strokes, at the time of entering the handwriting strokes without a special key depression, and replace entered line of text with the unique line of text or original word in the dictionary. None of the cited references discloses or suggests any means of determining the unique line of text of handwriting strokes which has the same unique position count as the number of last collated stroke position of said line of text of handwriting strokes in said dictionary, and replacing the entered line of text of handwriting strokes with the unique line of text, by way of entering the line of text of handwriting strokes, stroke by stroke, without necessity to depress the special function key to collate, determine, select, and replace.

A text input system of the present invention according to the claim 70 has a feature to enter a line of text of handwriting strokes, stroke by stroke, collate the entered line of text of handwriting strokes with those in a dictionary, identify plural lines of text with the same first part as the entered line of text, and determine a unique line of text which has the same last stroke

as the last entered stroke, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of stroke input, and also identify plural lines of text with the same first part which includes said entered line of text, and determine the unique line of text which includes the same one as the last entered strokes in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text,, among said identified plural lines of text, without being actuated by the depression of a special function key, at the time of stroke input. None of the cited references discloses or suggests any means of identifying plural lines of text with the same first part as said entered line of text, and determine a unique one which has the same last stroke as the last entered stroke, or which includes the same one as the last entered strokes in the remaining part of line of text of handwriting strokes other than that was successfully collated with the entered line of text.

A text input system of the present invention according to the claim 71 has a feature to enter a first stroke followed by some other following strokes of a line of text, stroke by stroke, collate the entered line of text with a dictionary, determine a unique line of text in the dictionary which includes the first stroke and some other following strokes of line of text, at the time of stroke input, without being actuated by the depression of a special function key. None of the cited references discloses or suggests any step of determining the unique one in the dictionary and replacing the entered line of text with the unique one determined by the determining step by way of entering the first stroke and some other following handwriting strokes to variably input, without necessity to depress the special function key to collate, determine, replace.

A text input method of the present invention according to the claim 63 or 69, wherein means for determining the unique line of text comprises determining a predetermined number of lines of text in the dictionary. None of the cited references discloses or

suggests any means for determining the predetermined number of
lines of text in the dictionary.

Examples to show the differences between the present
invention and the conventional method are shown in the following
tables 1 - 5.

- Table 1 - 〈 Present invention 〉
(An example of dictionary)

word pattern element codes of handwriting strokes	Original word	The number of position to be unique in the dictionary
02 01 12 11 02 ー ｜ ー ｜ ー	正	2
02 11 25 12 12 00 30 ー ｜ ⊃ ー ー ／ ＼ ｜	更	2
00 30 12 ／ ＼ ー	A	1
01 34 ／ 3	B	1
12 01 11 11 ー ｜ ∟ ー ー ｜	E	1

* In this example, "正" or "更" can be unique
  at the second pattern element code position.

- Table 2 - < Present invention >

Standard dictionary			Selective dictioary	
Word (or line of text)	The number of character position in a word to be unique in the dictionary	The total number of char. of the word	The number of character position in a word to be unique in the dictionary	
abandon	4	7	abandon	3
abate	4	5		
abbot	4	5		
abdomen	3	7	abdomen	3
abhor	3	5		
abide	4	5		
ability	4	7	ability	3
abject	3	6		
able	4	4		
abnormal	3	8	abnormal	3
aboard	4	6		
abolish	6	7	abolish	4
abolition	6	9		
abominable	4	10		
abound	5	6		
about	5	5	about	4
above	4	5		
abridge	4	7	abridge	3
abroad	4	6		
abrupt	4	6		
absence	6	7	absence	4
absent	6	6		
absinthe	4	8		
absolute	6	8	absolute	5

```
absolve     6          7
absorb      5          6
absorbent   7          9              absorbent    5
abstain     5          7              abstain      4
      |
      |
(Total)   127         184                41      79
   (127 / 184 = 0.69 : 31%        (41 / 79 = 0.52 : 48%
            differences                    differences
                                      (* 79 is the number
                                         of total char.)
```

- Table 3 - < Present invention >

Input	(Determining) step	(Selecting) step	(Replacing) step	(Display)

<Applicant's method, using the dictionary containing
        eg,
            ..., bonus, booby, book, booked, booking,
            ..., compulsory, compute, computer,
            computerization, computerize, computerizing,
            comrade,...etc. >

Input	(Determining) step	(Selecting) step	(Replacing) step	(Display)
b				
bo				
boo				
book	X(Active)			
bookg		X(active)	X(Active)	booking
c				
co				
com				
comp				
compu				
compute	X(Active)			
computeg		X(Active)	X(Active)	computerizing
computen		X(Active)	X(Active)	computerization

```
computee            X(Active)  X(Active)  computerize
```

* X(Active) means "Activation of Determining, Selecting, and Replacing" written on a header line.

```
- Table 4 -  < Conventional Method >
Input    (Searching)              (Display)
         step
------------------------------------------------------

time+WT(Word Terminator)          All strings
                                     having the
                                     same key
                                     are displayed .

time for+WT(Word terminator)      All strings
                                     having the
                                     same key
                                     are displayed

time for all+WT(Word Terminator)

                                  All strings
                                     having the
                                     same key
                                     (including)
                                     "time for all
                                     good men to
                                     to come to the
                                     aid of their
                                     country"
```

- Table 5 -

< Conventional Method >		< Present invention >	
Input	Display	Input /	Display
---------	-----------------	-------	--------
p	promise, promoter,... property, proportion, propose, protest, protest, proud, prove, provide, public, pull...etc (All matched words appear on the display)	p	
ps	--err--	ps	
prmi	--err--	prmi	promise (Because of its function to determine a unique one which includes a first char. and some other foll. char.)
prmt	--err--	prmt	promoter
prtt	--err--	prtt	protest
prv	--err--	prv	
prvd	--err--	prvd	provide
pr	promise, promotor,... property, proportion,	pr	

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                    propose, protest,
                    protest, proud,
                    prove, provide,
                    (All matched words
                     appear on the display)


pro                 promise, promoter,...      pro
                    property, proportion,
                    propose, protest,
                    protest, proud,
                    prove, provide,
                    (All matched words
                     appear on the display)


prom                promise, promoter,...      prom
                    (All matched words
                     appear on the display)


promi               promise                    promi     promise
                    (Incidentally              (Naturally, a unique
                    appears, because           one appears on the
                    the system does not        display, as its
                    support the specifc        normal system
                    function to determine       function)
                    a unique one)


pu                  public, pull               pu


pub                 public                     pub       public


pb                  --err--                    pb        public
```

REMARKS:

In reply to the indication of paragraph 2 in the Office communication, applicant amended the claims.

For the indication of paragraph 4, applicant noted.

In reply to the indication of paragraph 5, applicant revised the description.

In reply to the indication of paragraph 6, applicant amended the claims. "special key" means a function key like Tab, Carriage Return etc, and "without a further special key" means "without a special function key to depress after entering a character or a stroke."

In reply to the indication of paragraph 7, applicant amended the claims.

For the indication of paragraph 8, applicant understands.

In reply to the indication of paragraph 9, applicant amended the claims.

For the indication of paragraph 10, applicant understands.

In reply to the indication of paragraph 11, applicant makes the comments for the differences in between, as mentioned below.

According to the present invention, data is input, character by character or stroke by stroke, to form a line of text, and the system looks up in a dictionary, and tests if there is a unique data which include the entered data, and if it is true for (1) a leading part of data be unique by a position count, or (2) a first part and a last data or some other following data be unique, or (3) a stem of word and a last data or some other following data be unique, or (4) a first data and a last data or some other following data be unique, and what was determined is replaced with the input data, and relevant words data may be displayed for selection, and no more input is necessary.

According to the method of U. S. Patent 5109352, some Japanese kanji characters will never have a chance to appear on the display by the way mentioned in the patent (5109352), unless the operator forces to continue to input after having some characters on the display. According to the patent documents, the inventor of U. S. Patent# 5109532 discovered that some characters

are uniquely identifiable in the examples shown in the patent documents. However, there is incompleteness, as mentioned above.

In reply to paragraph of 12, applicant makes the following comments. Applicant understands that the followings (1), (2), and (3) are not comparable to the present invention.

(1)   U. S. Patent4 5305207 discloses that a Chinese character consists of 1, 2, 3 or more character units, and a first stroke of character unit can be designated by the numbers, 1, 2, 3, 4, or 5, a last stroke of character unit can be designated by the numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 0, and those designations jointly build up a numerical groups and are stored in a memory that is used to retrieve a desired character. It is likely that in the case of 散 , an operator enters 2 for - of 壮 and 2 for - of 壮 , enters 3 for | of 月 and 2 for - of 月 , and enters 3 for / of 父 and 8 for ＼ of 父, as is mentioned in Figure 2i of USP45305207. After entering the Arabic numbers code for each character unit of the Chinese character, those are assembled and collated with the stored character information to find the Chinese character corresponding to the entered code by the operator for display or further processing.

(2)   U. S. Patent 5212769 discloses an apparatus and method for encoding and decoding Chinese characters, converting the strokes of a Chinese character in a sequence conforming at least initially with the Chinese handwriting rules to a sequence of predefined basic stroke elements of three types (- | /), and determining the initial order of occurrences and the total number of occurrence of each type of basic stroke element in the character. The stroke sequence for 智, as an example is ノ一一ノ＼ㅣㄱ一ㅣㄱ一一 , and those are converted to the basic stroke elements which should be /一一//|-|-|-|一一 and the initial order of occurence of the different types of basic stroke elements for the character is "智" is /-|. (Page 9 of the spec.). It is noted from this example that only the order of occurences of the first 2 different types of basic stroke elements of a character need to be determined in order to obtain the initial order of occurrence of all three types of basic elements in the character. Total number of occurrences of

each different basic stroke element is also used to derive the character stroke code associated with the character being encoded or decoded, and, in the above example, "智" consists of 3 slant strokes (/), 4 vertical strokes (|), and 7 horizontal strokes (-), giving rise to a corresponding character stroke code of 3/7-4 for that character. It is necessary to examine each character after obtaining the character code to retrieve, as the character code may correspond to more than one character of a character set.

(3) U. S. Patent 5468077 discloses a character combining method and apparatus for combining character patterns by easily associating part patterns of "one typeface with those of another typeface," and by easily associating contour points of one typeface with those of another typeface.

It is respectfully requested that this patent application be reconsidered, claims 63-83 allowed, and the case passed to issue.

Very respectfully,

Applicant:
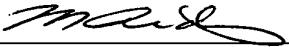
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Date: June 12, 2001

End. Amended Claims,
      Revised Specification,
      Part of Revision of Specification indicated in red